

Task 9: Fatigue Mitigation in Flight Operations (Nesthus)

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Project Start Date: 1/1/2008

Anticipated End Date: 10/31/2010

Requirements Statement	
Operational Shortfall or Knowledge Gap	Aircrew (pilot & cabin crew) performance is vulnerable to sleep loss and fluctuations of physiological processes tied to underlying body-clock mechanisms, particularly related to long range and Ultra Long Range (ULR) flights. ULR operations are those with flight times greater than 16 hours and a maximum duty time of 23 hr. Crew duty/rest for ULR flights are not covered by current CFRs.
Benefit in Closing the Shortfall or Gap	Flights operations should include scientific consideration of human circadian processes as applied toward training, duty time and rest scheduling, and fatigue risk mitigation for all crewmembers. Scientific information gained from studies of flightcrew fatigue during flight operations can be used to develop better fatigue mitigating duty and rest schedules and outline limits of acceptable performance and flight safety.
Description of the Desired Product	<p>Provide consultation and assistance to AFS-200 in the development and distribution of information and products designed to mitigate crewmember fatigue during the conduct of flight operations.</p> <p>Provide assistance and oversight to AFS-200 as an FAA representative and Chair of the A332 OpSpec Scientific Steering Committee (SSC) during development and completion of a data collection protocol to evaluate aircrew (i.e., flight and cabin crew) performance, sleep patterns, alertness, fatigue, mood, circadian rhythm disruption, and recovery from ultra-long-range flights as compared with current long-range flight operations. Assist in the coordination of the data collection and analysis phases, as per requested. Assist in the development of guidance text for 8900.1 on approval of flights with duty time greater than 12 hr. Assist in the development of an AC on Fatigue Risk Management Systems (FRMS) in Aviation Operations. And to participate in rule making committee activities and assist in the development of a regulatory Phase I and II RPR and NPRM for Flight Time, Duty Time, and Rest Requirements incorporating principles of FRMS.</p>
Schedule	<p>All Quarters FY10</p> <p>Participate in AFS scheduled meetings in support of the AFS Fatigue Mitigation projects as well as NPRM rulemaking activities as directed.</p> <p>Participate in periodic SSC meetings as Chair, related to the data collection efforts of the ULR vs. Non-ULR studies.</p>

Objectives

To assist the Air Transportation Division (AFS-200) as FAA scientific representative and Chair of the Scientific Steering Committee (SSC), in the development of a research protocol to:

- run coordinated studies across multiple airlines comparing pilot fatigue on current ultra-long range (ULR) operations and non-ULR long-haul operations;
- use an agreed set of core measures, equipment, and study procedures so that de-identified data from all participating airlines can be combined in a common database that will be accessible to the members of the SSC for further analyses, including evaluation of bio-mathematical models; and
- assist in guidance of standardize analysis procedures, for consistency in interpretation of results and ultimate application of recommendations across flight operations.

To assist the Air Transportation Division (AFS-200) in associated Fatigue Mitigation Projects to:

- clarify and define fatigue and the applicability of science in fatigue mitigation approaches;
- provide guidance text for 8900.1 on approval of flights with duty time greater than 12 hr.;
- develop an AC on Fatigue Risk Management Systems (FRMS) in Aviation Operations;
- develop language for a regulatory Phase I and II RPR, as well as an NPRM for Flight and Duty Time Limitations and Rest Requirements;
- establish the importance of crewmember awareness of fatigue on operational safety,
- establish crewmembers' associated responsibilities; and
- add provisions, limits, and standards that will provide understanding, focus, and actions required to ensure the safe conduct of these demanding flight operations.

Background

Pilots and flight attendants must be well-rested and able to effectively perform flight related duties, particularly during critical phases of each flight. The FAA considers the critical phases of flight to be from block-out to level-off at the initial cruise altitude and from top-of-descent until block-in. The primary driver of fatigue and performance degradation involves the circadian cycle of each crewmember relative to the time zone of his or her home base. Planning and evaluation of long range and ULR operations is critical and should include a focus on circadian cycles when considering rest and flight scheduling.

Air carriers proposing ULR operations need to develop plans for in-flight rest breaks that permit crewmembers to safely perform their duties throughout each flight. These plans should include requirements for crew rest prior to beginning their initial duty period, onboard rest, and opportunities to obtain adequate rest both during layovers and the return-to-base rest period. Return-to-base rest is intended for a crewmember to become fully-rested before a subsequent flight assignment.

Existing CFRs were originally developed with limited scientific consideration of the effects of fatigue. They remain complex and unchanged even with increased flight operations and flight times. CFRs treat daylight and back-side-of-clock operations, as well as single and multiple take-off and landing flights equally, even though their fatigue effects differ. The problem with this is that fatigue science has developed over the years to the extent that we have a more sophisticated understanding of fatigue issues than current regulations reflect. Enforcement of current CFRs may not adequately address the issues of fatigue.

AFS-200, most recently, became involved in this matter through an attempt to develop an Operations Specification on Ultra Long Range (ULR) flying (OpSpec A332). The intent was to apply fatigue mitigations to flights in excess of sixteen hours flight time to include the associated, extended duty times. OpSpec A332 was meant to provide direction that did not exist in the regulations. A332 application proved controversial, resulting in withdrawal of the draft OpSpec pending more effective action.

A Fatigue Mitigation Project was proposed by AFS-200 to address many of the fatigue issues discussed. Assistance has been requested of CAMI in support of the various elements of their fatigue mitigation project as well as with the activities of the Aviation Rulemaking Committee (ARC) that convened meetings between July and September 2009. Follow-on activities requested concerned help in drafting rulemaking language for an NPRM on Flight and Duty Time Limitations and Rest Requirements to be released for public comment in early 2010. It is anticipated that continued support will be requested for these rulemaking activities until implemented in 2011 or 2012.

Previous Activity on this Task

A ULR field study was conducted with one flag operation associated with their FAA approved OpSpec A332. To further address fatigue mitigation concerns with other carriers having similar ULR operations, a Scientific Steering Committee (SSC) was formed to develop a standardized data collection protocol, utilizing the same equipment and the same procedure. Data collection procedures have recently been initiated with three participating carriers. Comparisons within carriers will be conducted relative to crewmembers involved in long range flights (i.e., Non-ULR) and ULR flights. Between carrier comparisons will also be conducted relative to similar flight and city-pair operations.

Participation was requested on Aviation Rulemaking Committee activities including meeting attendance from July to September, 2009 and draft language development for an NPRM on Flight and Duty Time Limitations and Rest Requirements.

Proposed or Planned Research

1. To continue as the FAA representative and Chair of the SSC in development and coordination of Non-ULR and ULR operations data collection efforts and evaluations of the data analysis and modeling.
2. To continue supporting the Air Transportation Division (AFS-200) in development of their Fatigue Mitigation Projects, including:
 - a. assistance in developing guidance text for 8900.1 regarding approval of flight operations with duty times greater than 12 hours.
 - b. assistance in development of an AC on FRMS in Aviation Operations.
 - c. assistance in the drafting of a strategic plan for the development and implementation of appropriate guidance and regulations to manage risk associated with flight crew fatigue.
 - d. continued assistance for the rulemaking activities required until implementation in 2011 or 2012.

Research Question(s)

- How do the effects of the application of circadian-smart crew duty/rest scheduling have on flight and cabin crewmembers in ULR operations compare with LR operations? This addresses questions regarding pre-trip rest, enroute and layover rest, and return-to-base recovery rest with actigraphy and a simple performance measure to assess patterns of sleep, cognitive alertness, cumulative fatigue, mood, circadian rhythm disruption, and recovery during/following ULR trips compared with LR trips by the same crewmembers.
- What is the extent of sleep loss, fatigue, and their impact upon performance of duties among crewmembers?
- To what extent can the occurrence of such effects be modeled, predicted, and controlled?
- What training might serve to reduce fatigue effects among cabin crew?

Technical Approach

Current Year

Participate in meetings associated with all aspects of this project.

Out-Years

To continue participation as requested by sponsor.

Air Traffic Resources Required

None

Information Technology Resources Required

None

Calibration

None

FY10 Milestone Schedule		
Description	Proposed Start Date	Actual Completion Date
Work activities associated with SSC ULR – Non-ULR studies	FY10 Q1	FY10 TBD
Work activities associated with Aviation Rulemaking/NPRM	FY09 Q4	FY11 TBD

FY10 Deliverables		
Description	Proposed completion date	Actual completion date
Develop Draft OAM Technical Report	FY10 Q3	In progress
Submit OAM Technical Report for Review	FY10 Q3	
Quarterly Status/Progress Reports	FY10 Q4	